Patent claims

1. Rear-projection screen encompassing at least one light-scattering polymethyl methacrylate layer, which comprises a polymethyl methacrylate matrix and spherical scattering particles (A) and spherical particles (B) with a different median particle size V_{50}, where the spherical scattering particles (A) have a median size V_{50} in the range from 0.1 to 40 µm, the difference between the refractive index of the spherical scattering particles (A) and that of the polymethyl methacrylate matrix being in the range from 0.02 to 0.2, where the spherical particles (B) have a median size V_{50} in the range from 10 to 150 µm, the difference between the refractive index of the spherical particles (B) and that of the polymethyl methacrylate matrix being in the range from 0 to 0.2, and where the total concentration of the spherical scattering particles (A) and particles (B) is in the range from 1 to 60% by weight, based on the weight of the light-scattering polymethyl methacrylate layer, characterized in that the concentration of the spherical scattering particles (A) c_{PA}, the thickness of the light-scattering polymethyl methacrylate layer d_S and the size of the spherical scattering particles (A) D_{PA} is selected in such a way that the ratio $c_{PA}{}^{*}d_S/D_{PA}{}^{3}$ is in the range from 0.001 to 0.015% by weight*mm/µm^3, the concentration of the spherical particles (B) c_{PB}, the thickness of the light-scattering polymethyl methacrylate layer d_S and the size of the spherical particles (B) D_{PB} is selected in such a way that the ratio $c_{PB}{}^{*}d_S/D_{PB}{}^{3}$ is in the range from 0.000005 to 0.002% by weight*mm/µm^3 and the ratio of the square of average surface roughness of the polymethyl methacrylate layer R_z to the third power of the

size of the spherical particles (B) R_Z^2/D_{PB}^3 is in the range from 0.0002 to 0.1300 μm^{-1}.

2. Rear-projection screen according to Claim 1, characterized in that the ratio of the square of average surface roughness of the polymethyl methacrylate layer R_Z to the third power of the size of the spherical particles (B) R_Z^2/D_{PB}^3 is in the range from 0.0025 to 0.0600 μm^{-1}.

3. Rear-projection screen according to Claim 1 or 2, characterized in that the ratio of concentration of the particles (B) c_{PB} to the thickness of the light-scattering polymethyl methacrylate layer d_S c_{PB}/d_S is greater than or equal to 2.5% by weight/mm.

4. Rear-projection screen according to any of the preceding claims, characterized in that the gloss R85° of the light-scattering polymethyl methacrylate layer is smaller than or equal to 40.

5. Rear-projection screen according to any of the preceding claims, characterized in that the ratio c_{PA} $*d_S/D_{PA}^3$ is in the range from 0.0025 to 0.009% by weight*mm/μm^2.

6. Rear-projection screen according to any of the preceding claims, characterized in that the ratio c_{PB} $*d_S/D_{PB}^3$ is in the range from 0.00004 to 0.0015% by weight*mm/μm^2.

7. Rear-projection screen according to any of the preceding claims, characterized in that the thickness of the light-scattering polymethyl methacrylate layer is in the range from 0.05 to 1 mm.

8. Rear-projection screen according to any of the preceding claims, characterized in that the spherical scattering particles (A) and/or spherical particles (B) encompass crosslinked polystyrene, polysilicone and/or crosslinked poly(meth)acrylates.

9. Rear-projection screen according to any of the preceding claims, characterized in that the light-scattering polymethyl methacrylate layer has been coloured.

10. Rear-projection screen according to any of the preceding claims, characterized in that the matrix of the light-scattering polymethyl methacrylate layer has a refractive index in the range from 1.46 to 1.54, measured for the sodium D line (589 nm) and at 20°C.

11. Rear-projection screen according to any of the preceding claims, characterized in that the average surface roughness R_z of the screen is in the range from 4 to 50 µm.

12. Rear-projection screen according to any of the preceding claims, characterized in that the median size V_{50} of the spherical particles (B) is greater by at least 5 µm than the median size of the scattering particles (A).

13. Rear-projection screen according to any of the preceding claims, characterized in that the median size V_{50} of the spherical scattering particles (A) is in the range from 5 to 20 µm.

14. Rear-projection screen according to any of the preceding claims, characterized in that the median size V_{50} of the spherical particles (B) is in the range from 15 to 60 µm.

15. Rear-projection screen according to any of the preceding claims, characterized in that scratches produced on the screen using a force of at most 0.7 N are not visually detectable.

16. Rear-projection screen according to any of the preceding claims, characterized in that the screen also encompasses a backing layer which has a halved-intensity angle smaller than 6.5°.

17. Rear-projection screen according to Claim 16, characterized in that the backing layer has an average surface roughness R_z in the range from 3 to 40 µm.

18. Rear-projection screen according to Claim 16 or 17, characterized in that the backing layer comprises poly(meth)acrylates.

19. Rear-projection screen according to any of the preceding claims, characterized in that the thickness of the rear-projection screen is in the range from 0.05 to 5 mm.

20. Rear-projection screen according to any of the preceding claims, characterized in that the transmittance of the screen is greater than or equal to 25%.

21. Rear-projection screen according to any of the preceding claims, characterized in that the yellowness index of the screen is smaller than or equal to 12.

22. Rear-projection screen according to any of the preceding claims, characterized in that the halved-intensity angle of the screen is greater than or equal to 15°.

23. Rear-projection screen according to any of the preceding claims, characterized in that the scattering power of the screen is greater than or equal to 0.15.

24. Rear-projection screen according to any of the preceding claims, characterized in that the screen is composed of extruded polymethyl methacrylate with a path difference of at most 25 nm due to optical birefringence.

25. Process for producing a rear-projection screen according to any of Claims 1 to 24, characterized in that a moulding composition encompassing polymethyl methacrylate, spherical scattering particles (A) and spherical particles (B) is extruded.

26. Process according to Claim 25, characterized in that a screen or film is extruded and the extruded screen or foil is then heated to 110-190°C for from 5 minutes to 24 hours.

27. Use of a rear-projection screen according to any of Claims 1 to 24 in optical applications.

28. Use according to Claim 27 as a diffuser sheet in LCD monitors.

29. Use of a rear-projection screen according to Claim 24 for 3D projection.